©NIJRMS
Publications 2025

OPEN ACCESS
ONLINE ISSN: 2992-5460
PRINT ISSN: 2992-6041

NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN MEDICAL SCIENCES (NIJRMS)

Volume 7 Issue 2 Page 35-40, 2026

https://doi.org/10.59298/NIJRMS/2026/7.2.3540

Diabetes, Immune Dysfunction, and Emerging Infectious Diseases in Nigeria: A Pathophysiological and Epidemiological Review

Kibibi Wairimu H.

School of Natural and Applied Sciences Kampala International University Uganda

ABSTRACT

Diabetes mellitus (DM) is a rapidly growing non-communicable disease in Nigeria, posing a dual challenge by increasing the national burden of chronic disease while exacerbating susceptibility to infectious diseases. Immune dysfunction associated with diabetes, including impaired innate and adaptive immune responses, compromises the host's defense against pathogens. This immune dysregulation predisposes diabetic individuals to both endemic and emerging infectious diseases such as tuberculosis, malaria, Lassa fever, and COVID-19. The interaction between diabetes and infectious diseases creates a syndemic environment where chronic hyperglycemia amplifies infection risk and worsens outcomes. This review synthesizes current pathophysiological mechanisms linking diabetes and immune dysfunction, explores the epidemiological patterns of diabetes-infection comorbidity in Nigeria, and discusses implications for public health policy, surveillance, and integrated disease management. Strengthening metabolic control, infectious disease monitoring, and health system integration is essential for mitigating the compounded burden in Nigeria's evolving epidemiological landscape.

Keywords: Diabetes mellitus, immune dysfunction, Lassa fever, emerging infectious diseases, Nigeria.

INTRODUCTION

Diabetes mellitus (DM) has emerged as one of the most pressing public health challenges globally, posing significant threats to individual well-being, healthcare systems, and economic stability. Characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both, diabetes is broadly classified into type 1, type 2, gestational, and other less common types [1-6]. Among these, type 2 diabetes accounts for the majority of cases worldwide and is strongly associated with lifestyle factors such as unhealthy diets, physical inactivity, obesity, and urbanization. The prevalence of diabetes has surged over recent decades, with the World Health Organization (WHO) estimating that over 537 million adults worldwide are living with diabetes, a figure projected to rise to 643 million by 2030 [7-10].

Sub-Saharan Africa is experiencing one of the fastest-growing burdens of diabetes in the world. Rapid urbanization, dietary transitions from traditional to energy-dense diets, sedentary lifestyles, and population aging are driving this increase. In Nigeria, Africa's most populous nation, the diabetes epidemic is particularly alarming [11-16]. Current estimates from the International Diabetes Federation (IDF) suggest that approximately 5–6 million Nigerians are living with diabetes, though the true figure may be higher due to underdiagnosis and inadequate healthcare access. This burden is compounded by a high prevalence of infectious diseases, including malaria, tuberculosis, HIV/AIDS, and viral hemorrhagic fevers such as Lassa fever, which remain endemic or epidemic in various regions [17-22].

The interaction between diabetes and infectious diseases is complex and multidimensional. Diabetes mellitus affects innate and adaptive immune responses, leading to impaired chemotaxis, reduced phagocytic function, and altered cytokine production. These immunological changes increase susceptibility to bacterial, viral, and fungal infections, while simultaneously impairing the body's ability to resolve infections effectively [23-28]. Conversely, infections can precipitate hyperglycemia, induce insulin resistance, and exacerbate existing metabolic dysfunction, creating a

bidirectional relationship that complicates clinical management. For instance, patients with diabetes are more likely to experience severe manifestations of tuberculosis and malaria, delayed wound healing, and higher rates of infection-related complications [29-33]. Understanding these interactions is critical in a country like Nigeria, where healthcare systems are already under strain from concurrent burdens of infectious and non-communicable diseases [34-39].

Despite the increasing recognition of diabetes as a significant global health issue, its interaction with infectious diseases remains insufficiently explored in Nigeria. Most healthcare interventions have traditionally treated infectious and non-communicable diseases as separate entities, with little integration between care systems or surveillance. This approach leaves individuals with diabetes vulnerable to undiagnosed infections, delayed treatments, and worsened health outcomes. Furthermore, healthcare providers often lack standardized protocols for managing infections in diabetic patients, leading to inconsistent practices and subpar care. The dual burden of diabetes and infectious diseases also carries profound socio-economic consequences. Patients experience longer hospital stays, recurrent illnesses, and increased out-of-pocket costs, all of which exacerbate poverty and reduce productivity. On a national scale, poorly managed cases of diabetes-associated infections contribute to higher rates of morbidity and mortality, further straining Nigeria's already overburdened healthcare infrastructure. This issue is compounded by insufficient public health awareness, inadequate screening programs, and the absence of integrated diabetes management with infectious disease control. Therefore, a comprehensive understanding of the epidemiology, pathophysiology, and clinical consequences of infections in diabetic patients is urgently needed in Nigeria. This knowledge is essential to improve healthcare delivery, inform policy, and reduce the national disease burden.

Pathophysiological Basis of Immune Dysfunction in Diabetes

The immune system is crucial for defending the body against infections, yet diabetes, especially when poorly managed, impairs both innate and adaptive immunity through chronic hyperglycemia. High glucose levels disrupt the function of various immune cells, particularly neutrophils, which play a critical role in the body's first line of defense [40-45]. Hyperglycemia impairs neutrophil chemotaxis, phagocytosis, and microbial killing, with a reduced oxidative burst a key process in pathogen destruction. Additionally, macrophages exhibit diminished cytokine production and altered antigen presentation, further hindering the immune response. These defects create an environment conducive to pathogen invasion and persistence. On the adaptive immune side, diabetes interferes with T-cell activation and proliferation, weakening cellular immunity. Glycation of immunoglobulins, a common consequence of elevated blood sugar, reduces antibody binding efficiency, impairing the body's ability to mount an effective humoral immune response [46-51]. Further, decreased levels of complement components and disrupted cytokine signaling hinder immune coordination, resulting in poor infection resolution. Chronic low-grade inflammation, a hallmark of diabetes, exacerbates these immune dysfunctions. This inflammation, driven by advanced glycation end-products (AGEs), reactive oxygen species (ROS), and pro-inflammatory cytokines like IL-6 and TNF-α, contributes to endothelial dysfunction and tissue damage. These biochemical imbalances not only impair immune surveillance but also elevate susceptibility to infections, including viral and bacterial agents, compounding the overall health challenges in individuals with diabetes [46-51].

Epidemiological Trends in Diabetes and Infectious Diseases in Nigeria

The intersection of diabetes and infectious diseases in Nigeria is shaped by a complex interplay of epidemiological, socioeconomic, and environmental factors. Nigeria has one of the highest diabetes prevalence rates in Africa, with urban centers such as Lagos, Abuja, and Port Harcourt reporting rates of 5–10%. This is largely driven by urbanization, sedentary lifestyles, and dietary changes [11]. In contrast, rural areas exhibit lower, yet increasing, prevalence due to evolving socioeconomic patterns and better access to healthcare. Diabetic Nigerians are particularly vulnerable to endemic infections like tuberculosis (TB), malaria, and HIV/AIDS. Diabetes significantly elevates the risk of active TB, as it impairs macrophage function, a key component of the body's immune defense. This is reflected in higher TB prevalence among diabetic individuals, especially in urban areas [12]. Similarly, malaria poses heightened risks for diabetics, as hyperglycemia weakens immune responses, leading to prolonged parasitemia and severe clinical manifestations. In the case of HIV/AIDS, diabetes complicates management by exacerbating cardiovascular risk, dyslipidemia, and drug-induced metabolic issues, which can negatively impact treatment outcomes. Emerging infectious diseases, including Lassa fever, COVID-19, and monkeypox, further underscore the vulnerability of diabetic individuals. Lassa fever, endemic in many Nigerian states, causes more severe complications in diabetics, likely due to impaired viral clearance and endothelial injury. The COVID-19 pandemic revealed that diabetes is a major predictor of severe disease and mortality, mirroring global trends. Additionally, the immunosuppressed state associated with diabetes can lead to more severe outcomes in other viral hemorrhagic fevers and zoonotic infections, further emphasizing the need for targeted healthcare strategies for diabetic populations [13].

Socioeconomic and Health System Determinants

In Nigeria, the relationship between diabetes and infectious diseases is shaped by a complex interplay of socioeconomic and health system determinants, which extend far beyond biological mechanisms. One significant challenge is the diagnostic gap, where many individuals with diabetes remain undiagnosed due to limited access to healthcare facilities, inadequate screening programs, and a lack of public awareness [14]. This results in unmanaged hyperglycemia, which compromises the immune system and exacerbates the severity of infections. Furthermore, the fragmentation of Nigeria's health system further worsens the situation. Non-communicable disease programs, such as diabetes care, are often poorly integrated with infectious disease surveillance and response systems, hindering effective management of coexisting conditions. Socioeconomic disparities also play a crucial role, with poverty and limited access to nutritious food contributing to both the development of diabetes and increased susceptibility to infections [15]. Many individuals in low-income communities cannot afford healthy diets, increasing their risk of chronic diseases and infections. Additionally, cultural practices and health-seeking behaviors can delay proper medical intervention. In some areas, people may rely on traditional medicine or seek healthcare only when symptoms become severe, which can prevent timely diagnosis and treatment of both diabetes and infections. These interconnected factors underline the need for a more integrated approach to health care that addresses the underlying social determinants of health while improving healthcare infrastructure and awareness to better manage the dual burden of diabetes and infectious diseases in Nigeria [16].

Implications for Public Health and Disease Control

The coexistence of diabetes and infectious diseases demands a comprehensive approach, recognizing the complex interactions between these conditions at both biological and social levels. One key strategy is integrated disease surveillance, where diabetes screening is incorporated into existing infectious disease programs, such as tuberculosis (TB) and Lassa fever control. This integration would not only enhance the identification of high-risk populations but also improve the management of both diabetes and infectious diseases concurrently [17]. Strengthening primary healthcare services is also vital. Expanding access to diagnostic services, affordable medications, and diabetes education within primary healthcare settings would help mitigate complications associated with diabetes, while also enhancing the ability of individuals to resist infections. In addition, health education and awareness campaigns targeting rural and peri-urban communities are crucial. These campaigns should focus on promoting healthy lifestyles, the importance of glucose monitoring, and strategies for infection prevention, thereby empowering individuals to take proactive steps in managing their health [18]. Furthermore, the integration of non-communicable disease (NCD) and infectious disease departments at the policy level is essential for fostering collaborative efforts. Policymakers should encourage research that explores the intersection of diabetes and infectious diseases, such as through longitudinal studies that examine the specific relationships between these conditions in regions like Nigeria. These studies would provide valuable insights, leading to targeted, evidence-based interventions that could mitigate the public health impact of both diabetes and infectious diseases, improving overall disease control and health outcomes for affected populations [19].

Future Directions

Future directions in the intersection of diabetes and infectious diseases require comprehensive, multidisciplinary research to address emerging challenges. One critical area is investigating how diabetes alters immune responses to specific pathogens, such as Lassa virus and *Plasmodium falciparum*, which are known to impact vulnerable populations. Further studies are needed to understand how the altered immune system in diabetic individuals interacts with these pathogens, which may influence both disease outcomes and management strategies. Another priority is the exploration of vaccine efficacy within diabetic populations, as diabetes can potentially affect immune responses to vaccines [20]. Research in this domain could significantly inform immunization policies, particularly for diseases where vaccine responses may vary among individuals with chronic conditions like diabetes. Additionally, the integration of digital health tools, such as mobile health (mHealth) platforms, holds great promise in improving diabetes management and enabling continuous monitoring of infections in resource-limited settings. These technologies can provide real-time data, empowering individuals to manage their condition more effectively and enabling health providers to offer timely interventions. Urbanization and climate change further complicate the landscape, as environmental factors are known to influence both the prevalence of diabetes and patterns of disease vectors, such as those responsible for malaria and other vector-borne illnesses [21]. Multidisciplinary research is needed to explore how urbanization, changing climates, and environmental factors collectively impact the health of diabetic populations, especially in regions experiencing rapid urban growth and climate-related shifts. Addressing these interconnected issues requires a holistic approach to improve both diabetic care and infectious disease control.

CONCLUSION

In conclusion, the coexistence of diabetes mellitus and infectious diseases presents a growing challenge to public health in Nigeria. The immune dysfunction caused by diabetes makes individuals more susceptible to infections like tuberculosis, malaria, Lassa fever, and COVID-19, thereby exacerbating disease outcomes. The bidirectional

OPEN ACCESS
ONLINE ISSN: 2992-5460
PRINT ISSN: 2992-6041
relationship between these conditions, where diabetes worsens infection outcomes, and infections worsen diabetes control, highlights the urgent need for integrated health responses. Strengthening Nigeria's healthcare systems by improving diagnostic capacity, enhancing surveillance, and promoting patient-centered care is essential to address this dual burden. Furthermore, public health efforts should focus on increasing awareness, especially in rural and peri-urban areas, and integrating non-communicable disease management with infectious disease control. By adopting a more holistic approach, Nigeria can improve both the management of diabetes and the control of infectious diseases, ultimately improving health outcomes for affected populations. This integrated approach will be vital in mitigating the compounded health challenges posed by these conditions.

REFERENCES

1. Ejemot-Nwadiaro R. I, Ofili D. F. C, Ogbodo S. C, Okoroiwu H. U, Ukah U. V. Risk of Cardiovascular Disease Comorbidity in People Living with Diabetes in Africa. *Kampala International University Western Campus, Ishaka, Available at SSRN 4901142.*
2. Khan, M.A.B., Hashim, M.J., King, J.K., Govender, R.D., Mustafa, H., Al Kaabi, J.: Epidemiology of Type 2 Diabetes – Global Burden of Disease and Forecasted Trends. J Epidemiol Glob Health. 10, 107–111 (2020). https://doi.org/10.2991/jegh.k.191028.001
3. Alum, E.U. Optimizing patient education for sustainable self-management in type 2 diabetes. *Discov Public Health* **22**, 44 (2025). https://doi.org/10.1186/s12982-025-00445-5
4. Olamoyegun, M.A., Alare, K., Afolabi, S.A., Aderinto, N., Adeyemi, T.: A systematic review and meta-analysis of the prevalence and risk factors of type 2 diabetes mellitus in Nigeria. Clin Diabetes Endocrinol. 10, 43 (2024). https://doi.org/10.1186/s40842-024-00209-1
5. Ime F. Ani, item J. Atangwho, Regina I. Ejemot-Nwadiaro, Edisua H. Itam, Essien U. Essien (2011). Hypoglycaemic effect and proximate composition of some selected Nigerian traditional diets used in the management of Diabetes Mellitus. *European Journal of Food Research & Reviews, 1, (2), 94-101. http://publications.journalstm.com/id/eprint/1214*.
6. Krishnamoorthy, R., Gatasheh, M. K., Subbarayan, S., Vijayalakshmi, P., Uti, D. E. Protective Role of Jimson Weed in Mitigating Dyslipidemia, Cardiovascular, and Renal Dysfunction in Diabetic Rat Models: In Vivo and in Silico Evidence. Natural Product Communications. 2024;19(12). doi:10.1177/1934578X241299279
7. Eze E. D, Afodun A. M, Kasolo J, Kasozi K.. L. (2019). Lycopene improves on basic hematological and immunological parameters in diabetes. **Research Square**,https://doi.org/10.21203/rs.2.16409/v1
8. Berbudi, A., Rahmadika, N., Tjahjadi, A.I., Ruslami, R.: Type 2 Diabetes and its Impact on the Immune System. Curr Diabetes Rev. 16, 442–449 (2020). https://doi.org/10.2174/1573399815666191024085838
9. Mustafa I O, Tanko Y, Yusuf R, Musa S A (2023). Gender Disparity in the Management of Diabetes among Residents of Sabon Gari Local Government Area of Kaduna State, Nigeria. *Journal of Diagnosis & Case Reports. SRC/JDCRS-138, 4, (1), 2-3.*
10. Dash, U.C., Bhol, N.K., Swain, S.K., Samal, R.R., Nayak, P.K., Raina, V., et al Oxidative stress and inflammation in the pathogenesis of neurological disorders: Mechanisms and implications. Acta Pharmaceutica Sinica B. 15, 15–34 (2025). https://doi.org/10.1016/j.apsb.2024.10.004
11. Mitaki NB, Fasogbon IV, Oviosun A *et al.* Preclinical evidence of the efficacy of cucurbita plants in diabetes management: a systematic review [version 1; peer review: awaiting peer review]. *F1000Research* 2025, **14**:668 (https://doi.org/10.12688/f1000research.166533.1)
12. Ogbo, F.A., Ogeleka, P., Okoro, A., Olusanya, B.O., Olusanya, J., Ifegwu, I.K., et al: Tuberculosis disease burden and attributable risk factors in Nigeria, 1990–2016. Tropical Medicine and Health. 46, 34 (2018). https://doi.org/10.1186/s41182-018-0114-9
13. Obasi, D.C., Abba, J.N., Aniokete, U.C., Okoroh, P.N., Akwari, A.A. (2025). Evolving Paradigms in Nutrition Therapy for Diabetes: From Carbohydrate Counting to Precision Diets. Obesity Medicine, 2025; 100622. https://doi.org/10.1016/j.obmed.2025.100622
14. Iregbu, S., Spiers, J., Duggleby, W., Salami, B., Schick-Makaroff, K.: Nigerian Health Care Providers and Diabetes Self-Management Support: Their Perspectives and Practices. Qual Health Res. 33, 92–105 (2023). https://doi.org/10.1177/10497323221143889
15. Obeagu E. I., Scott G.Y, Amekpor F, Ugwu O. P. C, Alum E. U (2023). Covid-19 Infection and Diabetes: A Current Issue. *International Journal of Innovative and Applied Research, 11,(1), 25-30.*
16. Atwine, F., Hultsjö, S., Albin, B., Hjelm, K.: Health-care seeking behaviour and the use of traditional medicine among persons with type 2 diabetes in south-western Uganda: a study of focus group interviews. Pan Afr Med J. 20, 76 (2015). https://doi.org/10.11604/pamj.2015.20.76.5497

OPEN ACCESS
ONLINE ISSN: 2992-5460
PRINT ISSN: 2992-6041

17. Mitaki, N.B., Fasogbon, I.V., Ojiakor, O.V., Makena, W., Ikuomola, E. O., Dangana, R.S., et al. (2025). A systematic review of plant-based therapy for the management of diabetes mellitus in the East Africa community. Phytomedicine Plus, 5(1): 100717. https://doi.org/10.1016/j.phyplu.2024.100717
18. Eseadi, C., Amedu, A.N., Ilechukwu, L.C., Ngwu, M.O., Ossai, O.V.: Accessibility and utilization of healthcare services among diabetic patients: Is diabetes a poor man's ailment? World J Diabetes. 14, 1493–1501 (2023). https://doi.org/10.4239/wjd.v14.i10.1493
19. Ikpozu, E.N., Offor, C.E., Igwenyi, I.O., Obaroh, I.O., Ibiam, U.A., et al. RNA-based diagnostic innovations: A new frontier in diabetes diagnosis and management. Diabetes & Vascular Disease Research. 2025;22(2). doi:10.1177/14791641251334726
20. Sohail, M.U., Mashood, F., Oberbach, A., Chennakkandathil, S., Schmidt, F.: Frontiers | The role of pathogens in diabetes pathogenesis and the potential of immunoproteomics as a diagnostic and prognostic tool. https://doi.org/10.3389/fmicb.2022.1042362
21. Ugwu, O.P.C., Kungu, E., Inyangat, R., Obeagu, E. I., Alum, E. U., Okon, M. B., et al. Exploring Indigenous Medicinal Plants for Managing Diabetes Mellitus in Uganda: Ethnobotanical Insights, Pharmacotherapeutic Strategies, and National Development Alignment. INOSR Experimental Sciences. 2023; 12(2):214-224. https://doi.org/10.59298/INOSRES/2023/2.17.1000.
22. Ugwu OPC, Alum EU, Okon MB, Aja PM, Obeagu EI, Onyeneke EC. Ethanol root extract and fractions of Sphenocentrum jollyanum abrogate hyperglycaemia and low body weight in streptozotocin-induced diabetic Wistar albino rats. RPS Pharm Pharmacol Rep. 2023;2(2):rqad010.
23. Ugwu OPC, Alum EU, Okon MB, Aja PM, Obeagu EI, Onyeneke EC. Anti-nutritional and gas chromatography-mass spectrometry (GC-MS) analysis of ethanol root extract and fractions of Sphenocentrum jollyanum. RPS Pharm Pharmacol Rep. 2023;2(2):rqad007.
24. Ugwu OPC, Amasiorah VI. The in vitro antioxidant potentials of the crude ethanol root extract and fractions of Sphenocentrum jollyanum. INOSR Appl Sci. 2020;6(1):125–33.
25. Ugwu OPC, Amasiorah VI. The effects of the crude ethanol root extract and fractions of Sphenocentrum jollyanum on hematological indices and glycosylated haemoglobin of streptozotocin-induced diabetic rats. INOSR Sci Res. 2020;6(1):61–74.
26. Ugwu OPC, Amasiorah VI. The effects of crude ethanol root extract and fractions of Sphenocentrum jollyanum on the lipid profile of streptozotocin-induced diabetic Wistar albino rats. IDOSR J Biol Chem Pharm. 2020;5(1):36–46.
27. Ugwu OPC, Amasiorah VI. The in vivo antioxidant potentials of the crude ethanol root extract and fractions of Sphenocentrum jollyanum on oxidative stress indices in streptozotocin-induced diabetic rats. IDOSR J Biol Chem Pharm. 2020;5(1):26–35.
28. Ugwu OPC, Onyeneke EC, Igwenyi IO, Aja PM, Okon MB. The effects of crude ethanol root extract and fractions of Sphenocentrum jollyanum on liver and kidney function parameters of streptozotocin-induced diabetic Wistar albino rats. IAA J Sci Res. 2018;4(1):75–90.
29. Aja PM, Igwenyi IO, Ugwu OPC, Orji OU, Alum EU. Evaluation of anti-diabetic effect and liver function indices of ethanol extracts of Moringa oleifera and Cajanus cajan leaves in alloxan induced diabetic albino rats. Global Vet. 2015;14(3):439–47.
30. Offor CE, Ugwu OPC, Alum EU. The anti-diabetic effect of ethanol leaf-extract of Allium sativum on albino rats. Int J Pharm Med Sci. 2014;4(1):1–3.
31. Ugwu OPC, Alum EU, Uhama KC. Dual burden of diabetes mellitus and malaria: exploring the role of phytochemicals and vitamins in disease management. Res Invent J Res Med Sci. 2024;3(2):38–49.
32. Obeagu EI, Ugwu OPC, Alum EU. Poor glycaemic control among diabetic patients: a review on associated factors. Newport Int J Res Med Sci. 2023;3(1):30–3.
33. Alum EU, Ugwu OPC, Obeagu EI, Ugwu CN, Uti DE, Samson AO, et al. Nutritional care in diabetes mellitus: a comprehensive guide. Int J Innov Appl Res. 2023;11(12):16–25.
34. Alum EU, Ugwu OPC, Obeagu EI, Uti DE, Egba SI, Alum BN. Managing the dual burden: addressing mental health in diabetes care. Elite J Med Sci. 2024;2(6):1–9.
35. Alum EU, Obeagu EI, Ugwu OPC, Alum BN, Arinze ED, Ukaidi CUA. Exploring the differential impacts of intermittent fasting on men and women. Elite J Health Sci. 2024;2(5):37–44.
36. Obeagu EI, Scott GY, Amekpor F, Ugwu OPC, Alum EU. Covid-19 infection and diabetes: a current issue. Int J Innov Appl Res. 2023;11(1):25–30.

OPEN ACCESS
ONLINE ISSN: 2992-5460
PRINT ISSN: 2992-6041

37. Alum EU, Ugwu OPC. Beyond pregnancy: understanding the long-term implications of gestational diabetes mellitus. INOSR Sci Res. 2024;11(1):63–71.
38. Ugwu OPC, Ugwu MN, Basajja M, Anyanwu CN, Ogenyi FC, Ugwu CN, et al. Targeting gut microbial signatures to personalize obesity treatment: integrating microbiome-based stratification into precision medicine. Obes Med. 2025;57:100639.
39. Ugwu OPC, Ogenyi FC, Ugwu CN, Ugwu MN. Gut microbiota-derived metabolites as early biomarkers for childhood obesity: a policy commentary from urban African populations. Obes Med. 2025;57:100641.
40. Ugwu OPC, Swase DT, Okon MB, Mujinya R. Traditional East African medicinal plants as modulators of gut microbiota in obesity-associated diabetes: a short communication. Obes Med. 2025;654:00654.
41. Uti DE, Omang WA, Alum EU, Ugwu OPC, Wokoma MA, Oplekwu RI, et al. Targeting CD44-hyaluronic acid signalling in obesity treatment: insights from small molecules and nanobioconjugates. Nutr Metab Insights. 2026;19:11786388251408961.
42. Uti DE, Omang WA, Alum EU, Atangwho IJ, Ugwu OPC, Wokoma MA, et al. Combined hyaluronic acid nanobioconjugates impair CD44-signaling for effective treatment against obesity: a review of comparison with other actors. Int J Nanomedicine. 2025;20:10101–26.
43. Uti DE, Egbung JE, Alum EU, Bawa I, Ugwu OPC, Egba SI, et al. Nanotechnology-enabled targeted delivery of incretin therapies for the treatment of obesity and metabolic disorders. Obes Med. 2026:100712.
44. Ugwu OPC, Eke MC, Ogenyi FC, Basajja M, Ugwu CN. Could chronic exposure to nocturnal artificial light pollution be an overlooked driver of urban obesity and metabolic syndrome? Med Hypotheses. 2025;205:111819.
45. Alum EU, Izah SC, Uti DE, Ugwu OPC, Betiang PA, Basajja M, et al. The ketogenic diet in obesity management: friend or foe? Cell Biochem Biophys. 2025.
46. Udeh SMC, Nwodo OFC, Yakubu OE, Parker EJ, Egba SI, Omenyi SN, et al. Effects of methanol extract of Gongronema latifolium leaves on glycaemic responses to carbohydrate diets in streptozotocin-induced diabetic rats. J Biol Sci. 2022;22:70–9.
47. Ugwu OPC, Alum EU, Obeagu EI, Okon MB. Effect of ethanol leaf extract of Chromolaena odorata on lipid profile of streptozotocin-induced diabetic Wistar albino rats. IAA J Biol Sci. 2023;10(1):109–17.
48. Ugwu OPC, Alum EU, Obeagu EI, Okon MB. Effect of ethanol leaf extract of Chromolaena odorata on hepatic markers in streptozotocin-induced diabetic Wistar albino rats. IAA J Appl Sci. 2023;9(1):46–56.
49. Aja PM, Ibekwe VI, Ekpono EU, Ugwu PC, Ugwu OPC. Effect of ethanol extract of Cajanus cajan leaf on plasma lipid level in albino rats. Int J Curr Res Acad Rev. 2015;3(1):161–7.
50. Obeagu EI, Ugwu OPC. Overweight and obesity among adolescents: a review. Newport Int J Res Med Sci. 2023;3(1):25–9.
51. Obeagu EI, Ugwu OPC. Insulin self-medication among diabetic patients: a review of associated factors. Newport Int J Res Med Sci. 2023;3(1):21–4.

CITE AS: Kibibi Wairimu H. (2026). Diabetes, Immune Dysfunction, and Emerging Infectious Diseases in Nigeria: A Pathophysiological and Epidemiological Review. NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN MEDICAL SCIENCES, 7(2):35-40
https://doi.org/10.59298/NIJRMS/2026/7.2.3540